Health Consultation

Trent Avenue (SR 290) Realignment Spokane, Spokane County, Washington

May 26, 1998

Prepared by
The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

BACKGROUND AND STATEMENT OF ISSUES

The Washington State Department of Health (DOH) has prepared this health consultation at the request of the Washington State Department of Ecology (Ecology) to evaluate the potential public health hazards posed by contaminants in the vicinity of the proposed Trent Avenue (SR 290) realignment located in Spokane, Spokane County, Washington. This health consultation will consider both current and future land use scenarios. DOH prepares health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

The Washington Department of Transportation (DOT) has proposed two alternatives to realign Trent Avenue so that it no longer crosses the Spokane River. The proposal would require approximately 0.75 miles of new road, some of which would cover suspected areas of environmental contamination located along the banks of the Spokane River. These areas were identified in a limited assessment released by DOT in February 1996. These areas include the former Spokane Gas Manufacturing (CERCLIS NO. WAD981762990), the former American Tar Company (CERCLIS NO. WAD981766272), a former rail yard, the former Spokane Inland Empire Railroad power substation, Freedom Marine Manufacturing and the former St. Louis Brass and Iron Foundry. [1] Figure 1 shows the approximate location of each of these sites.

Brown Building Materials (BBM) now occupies the site of the former Spokane Gas and American Tar companies, and is located directly beneath the Hamilton Street Extension on the south bank of the Spokane River. The Spokane Gas Manufacturing company occupied approximately 1.3 acres along the river and functioned as a coal gasification facility from 1905-1948, producing the fuel "town gas" as the primary product. Coal tar was produced as a byproduct and sold to the American Tar Company, located adjacent and directly to the south. Light oils were also produced as a byproduct and may have been disposed on-site. Other wastes likely disposed on-site include ash and clinkers (metallic, granular debris probably composed of silicon, calcium, and aluminum oxides.) Wastewater was discharged directly to the Spokane River and probably contained ammonia, various petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs). [2,3]

Historic analysis of coal gasification plants indicate that tar-water emulsion leaks occurred from all stages of production. In addition, some plants suffered from high water contamination of the tar byproduct reducing its value and perhaps increasing on-site dumping. Historic use of fill along the south bank of the river has increased the acreage of the area and changed the original location of the south bank of the river. This is consistent with other plants that reportedly used brick from demolished process structures as fill. [3,4] Fill has also been used more recently to cover spots of surface tar. [1,5] Figure 2 gives the former locations of buildings owned and operated by the Spokane Gas and American Tar companies.

The former rail yard is located east of the BBM property along Riverside Avenue. Various maintenance and warehousing activities were conducted at the site by the Burlington Northern Santa Fe Railroad. Soil windrows remain in this area from previous cleanup conducted by the City of Spokane along Riverside Avenue. The former Spokane Inland Empire Railroad power

substation property is located west of Erie Street and is currently owned by BBM. This area was identified as a power substation in 1910, but was later occupied by Western Light Metals. Freedom Marine Manufacturing is a fiberglass boat manufacturer located on Front Avenue west of Erie Street and the BBM property. The former St. Louis Brass and Iron Foundry operated from the 1930s through the late 1960s on Erie Street just north of Freedom Marine on the south bank of the Spokane River. [5]

Site Visit

On January 23, 1998, Robert Duff and Cindy Gleason (DOH) accompanied Mark Fuchs (Ecology) on a site visit of the areas of concern outlined above. Windrowed soil was noted to be present along Riverside Avenue in the area of the former rail yard (see Appendix A for site photos). The area of the former Spokane Gas and American Tar companies was noted to be occupied by BBM with a considerable amount of salvage construction materials extending along the south bank of the Spokane River from Erie Street east to the former train tunnels. Two transient dwellings were visible at the end of Riverside Avenue located on a basalt bluff east of the BBM property. It is not known whether or not these dwellings are currently occupied or how frequently they are used.

Access to the river on the BBM property was limited by vegetation with one footpath to the water noted. Salvage materials were arranged in an orderly fashion some of which were within several feet of the river bank including a stack of creosote treated rail road ties. Monitoring wells were also noted on the site.

Environmental Investigations

A May 1995 Screening Site Inspection Report prepared for the United States Environmental Protection Agency (EPA) included sediment and surface water sampling in the Spokane River. One surface water sample with duplicate was taken near the south bank of the river, adjacent to the site, approximately 60 meters downstream of the Hamilton Street Extension. One sediment sample was taken downstream of the site on the north bank of the river. Background sediment and surface water samples were taken upstream of the site. Sediment and surface water samples were analyzed for inorganics (metals), polychlorinated biphenyls (PCB) and semi-volatile organic compounds (SVOC), and polynuclear aromatic hydrocarbons (PAH). [2]

Further and more extensive sampling of soil and groundwater was conducted in September 1997 in response to the areas of concern outlined in the DOT limited assessment. Soil sampling in the former rail yard area along Riverside Avenue included 10 test pit soil samples and 2 surface soil grab samples taken from the windrowed soil stockpile. Soil samples were also taken from 47 borings located primarily in the vicinity of the former Spokane Gas Works as well as other areas of concern noted above. At the time of this sampling event, visible contamination was still present at the terminus of some of these borings, with observations of free phase hydrocarbons and tar-like substances at various depths. Groundwater samples were taken from six of these soil borings in the vicinity of the former Spokane Gas Works, using a temporary well point. Both

soil and groundwater samples were analyzed for metals, PCB, SVOC, PAH and total petroleum hydrocarbons (TPH). [2] The location of these soil borings are shown in Figure 2.

The most recent investigation included installation of 8 monitoring wells (five shallow and three deep) located around the perimeter of the former Spokane Gas Company (see Figure 2). Groundwater samples taken from these wells in December 1997 were analyzed for PAH and cyanide. One soil boring sample was analyzed for volatile organic chemicals (VOC), SVOC, TPH, cyanide and metals. A single sediment sample was collected from a location in the Spokane River immediately adjacent to the site, while a background sediment sample was taken at an upstream location. One surface water sample was also taken at each of these locations. Sediment and surface water samples were analyzed for PAH and cyanide. [6]

The maximum detected levels of the contaminants of concern are given in Table 1 below. Contaminants of concern are chosen based on comparison of levels detected in each medium with respective screening values for that medium. Contaminants of concern do not necessarily represent a public health hazard, but signify the need for further evaluation. The screening values used in this consultation are provided by ATSDR.

Table 1
Maximum Levels of Contaminants of Concern at
the former Spokane Gas and American Tar Companies

	Sediment	Surface Water	Surface Soil *	Sub-surface Soil **	Groundwater
CONTAMINANT	*ppm*	*ppb*	*ppm*	*ppm*	*ppb*
PAH	0.42	1.64	4.3	129,036	9866
TPH	NA	NA	1840	396,000	206,000
SVOC					
dibenzofuran	ND	ND	NA	800	77.1
carbazole	ND	ND	NA	2270	262
bis-2-ethylhexylphthalate	ND	ND	NA	ND	27
n-nitrosodiphenylamine	ND	ND	NA	179	53.6
INORGANICS					
arsenic	9.3	2.6	12.3	59	28
lead	59	4.4	568	799 +	1.5

* = Surface soil samples were taken only in the vicinity of the former rail yard area.
** = Sub-surface soil sample maximums found at various depths in the vicinity of the former Spokane Gas Company.
\+ = This maximum detection of lead was located in the former rail yard area. The maximum lead level found on the former Spokane Gas Company site is 427 ppm.
ND = Not detected
NA = Not analyzed.

The data given in Table 1 indicate that a substantial source of coal gasification byproducts exist at significant depths below ground surface in the vicinity of the former Spokane Gas and American Tar companies. The primary soil contaminants are TPH and PAH. Surface soil

sampling data are limited to test pits and grab samples taken in the former rail yard area. They do not include areas where highly contaminated soil boring samples were taken. Arsenic was also detected at elevated levels in sub-surface soil and moderately high lead levels were found in both surface and sub-surface soil.

Groundwater analyses indicate very high levels of TPH and PAH. However, these data were generated exclusively from well sampling points established in soil borings SB-1 through SB-37 that are suspect for suspended solid or phase separated product contamination. Subsequent analysis of groundwater samples taken from 8 monitoring wells showed no detection of PAH, but were not sampled for TPH or SVOC. It should be noted that these monitoring wells were not located in the previously identified areas of high soil and groundwater contamination, but were located so as to define the perimeter of this contamination.

Surface water and sediment samples taken from the Spokane River, indicate minimal PAH contamination. However, only one sediment sample and two surface water samples were taken adjacent to the site. A second sediment sample taken downstream and on the opposite bank of the river, detected trace levels of PAH. Surface water and sediment were not analyzed for TPH.

DISCUSSION

The proposed realignment of Trent Avenue (SR 290) would place the roadway through the current BBM property and along a portion of Riverside Avenue. BBM is located on property formerly occupied by the Spokane Gas and American Tar companies. Significant sub-surface soil contamination related to byproducts from the past coal gasification, has been found in this area. The area along Riverside Avenue that would also be occupied by the new road was formerly used as a rail yard. Elevated levels of lead and TPH have been found in both surface and sub-surface soil in this area. The remaining areas investigated in the preliminary assessment of the area performed for DOT did not reveal significant contamination.

The following discussion addresses the potential exposure of persons who might come into contact with soil, sediment, and surface water at or near the BBM property.

Soil

Current exposures to contaminants in soil are limited to transient persons exposed via accidental ingestion and dermal contact to surface soil in the vicinity of the former rail yard. Contaminants of concern in surface soil in the vicinity of the former rail yard include TPH and lead detected at a maximum of 1804 and 568 ppm, respectively. No adverse health effects are anticipated to result from exposure of transient persons living near the site to contaminants in soil. Although surface soil sampling is limited to the former rail yard area along Riverside Avenue, extensive soil borings taken throughout the other areas of concern indicate visible contamination only at depth. This fact is supported by evidence that fill had been placed on-site at various times, including efforts to cover visible tar with approximately 4 feet of fill. Therefore, no completed

exposure pathway exists for customers and workers at the BBM property.

The proposed realignment of Trent Avenue represents a potential exposure pathway for road workers to contaminants in surface and sub-surface soil. However, the nature of any such exposure would be limited by the duration of the project. As noted above, contaminants detected on the BBM property are below ground surface, but could present an opportunity for exposure depending upon the extent of excavation necessary for the road construction. While most of the significant contamination appears to be greater than 7.5 feet below ground surface, some borings were described as hydrocarbon stained in the 0-5 foot range. No adverse health effects are anticipated to result from a 6-month exposure of road workers to the maximum levels of TPH and lead detected in surface or sub-surface soil in any areas of the proposed Trent Avenue realignment. It is important to note that road workers who directly manipulate hot tar can be exposed to PAH via inhalation and dermal contact, depending upon labor practices and personal protective equipment.

Surface water and sediment

A maximum of 4.4 ppb lead was detected in surface water and 53 ppm in sediment taken from the Spokane River. TPH was not analyzed in sediment or surface water samples. PAH was found at a maximum of 1.6 ppb in surface water and 0.42 ppm in sediment samples taken from the river. The area of the Spokane River, adjacent to the site, is well covered with brush. Some clearings provide access via foot paths. There are no residences in the area and no evidence that trespassers may be using the BBM property for recreational access to the river. Although there is evidence that transient persons live in this area, it is unlikely that they use the river for bathing or drinking water.

The Trent Avenue realignment is not anticipated to increase access to the river as the area is zoned heavy industrial, and the new road will leave little room for development in this area. It is important to note, however, that only one sediment and two surface water samples have been taken adjacent to the site. Although the potential for significant human health exposure is limited, available data is not sufficient to determine the extent of sediment and surface water contamination along the south bank of the river that is adjacent to the site. Any future land use that involves increased access to the river, should be preceded by further evaluation of river surface water and sediment.

Groundwater

Groundwater samples taken from soil borings using temporary well casings and screens indicate very high, but localized contamination with maximum concentrations of TPH and PAH at 206,000 and 9866 ppb, respectively. The actual levels of dissolved contaminants may be considerably lower since these samples are suspect for suspended solid contamination. PAH was detected at a maximum of 272 ppb in only one of eight monitoring wells (MW-2d) installed around the periphery of the high contamination zone defined by the previous soil borings. TPH was not analyzed in these samples. Only one well (private) exists within a one-mile radius of the BBM property. Three (3) public water supply wells (Nevada, Grace and Ray), operated by the City of Spokane, are within a 2 mile radius (see Figure 3). [7, 8] These wells have tested below detection levels for PAH as recently as August or October 1997, but have not been analyzed for TPH. [9] No data was located on the single private well.

The BBM property appears to be located at the edge of the Spokane Valley-Rathdrum Prairie Aquifer. Water level measurements indicate that groundwater in the shallow zone moves along a very slight gradient away from the river in a northeast direction. The deeper monitoring wells are approximately 40 feet below ground surface and indicate very little horizontal movement, but do show a downward gradient. None of the soil borings or monitoring wells reached bedrock, but bedrock outcroppings are visible to the south of the site. It is unclear how this shallow zone of groundwater relates to the Spokane Valley-Rathdrum Prairie Aquifer which supplies drinking water to the city via many public supply wells. This aquifer is designated by EPA as a sole source aquifer. Groundwater in this aquifer moves generally to the west until it hits a basalt rock formation at Five Mile Prairie where it then turns north. Although the shallow flow around the BBM property appears to be opposite to that of the larger aquifer, it is likely that this shallow groundwater eventually moves vertically into this unconfined aquifer.

Phase 1 of a recent study completed for the City of Spokane Wellhead Protection Program shows that the BBM property is not in the capture zones of existing supply wells operated by the city. However, the site appears to be within or very near to the capture zone of one of two new wells (West) proposed by the city. The exact location of these new wells has not been yet been determined and could differ from the locations used to model the capture zones. [8] A wellhead protection study is currently being prepared for the Spokane Aquifer Joint Board that will predict capture zones for public supply wells not owned by the city. Initial results from this study indicate that the BBM property is not within the capture zones of any of these public supply wells. [10]

Preliminary investigations at the BBM property indicate that groundwater movement in the area is slow. Three public supply wells are located within 2 miles of the BBM property. The lack of PAH in these wells, along with their predicted capture zones, indicate that residents supplied by these wells are not being exposed to contaminants related to BBM. However, since PAH and TPH contamination is extensive in BBM soil and groundwater, further characterization of groundwater is necessary to determine the extent of contamination and the potential threat to future wells in the area.

Exposure Pathways and Children

The potential for exposure and subsequent adverse health effects are often increased for young children as opposed to older children or adults. For example, children are far more likely to engage in activities that involve "getting dirty". Playing in dirt, combined with frequent hand to mouth activity, provides toddlers with an increased chance of exposure to soil contaminants by way of ingestion and skin contact. In addition to the potential for higher exposures of young children, the risk of adverse health effects is also increased. ATSDR and DOH recognize that children are susceptible to developmental toxicity that can occur at levels much lower than those causing other types of toxicity. These effects can be subtle as is the case with lead poisoning which has been linked to behavioral changes including poor performance in the classroom.

The potential for exposure of children at the BBM property was examined with the above considerations in mind. Since the area is industrialized, exposure is limited and is not expected to involve children.

CONCLUSIONS

No apparent public health hazard exists for transient persons living near the Brown Building Materials property who might be exposed to contaminants in soil. Lead and TPH levels in surface soil along Riverside Avenue are elevated, but are below levels of concern.

Exposure to Spokane River surface water and sediment is considered unlikely. However, DOH does not consider the current sediment and surface water sampling sufficient to estimate human health risk should future land use result in increased exposure. This consultation did not consider the potential for ecological impacts on the Spokane River.

No apparent public health hazard exists for workers or customers at the Brown Building Materials exposed to contaminants in surface soil. Although a significant amount of coal gasification byproducts exist at depth, surface soil does not appear to be significantly impacted.

No apparent public health hazard exists for workers who may be potentially exposed to contaminants in surface or sub-surface soil while constructing the Trent Avenue realignment. Workers may excavate some contaminated soil during road construction but exposure is expected to be minimal.

No current public health hazard exists for residents drinking water from public supply wells located near the Brown Building Materials property. Site related contaminants have not been detected and are not anticipated in nearby public supply wells. However, site characterization is currently insufficient to predict the extent of groundwater contamination in the area. Future public supply wells located near the site could be at risk from contaminants originating at the Brown Building Materials property.

RECOMMENDATIONS

DOH recommends further characterization of contaminants at Brown Building Materials relative to their potential impact on the Spokane Valley-Rathdrum Prairie Aquifer. Existing data is not sufficient to determine whether future wells located in this aquifer and near to Brown Building Materials would be at risk for site related contamination.

DOH recommends further characterization of Spokane River sediment and surface water near the Brown Building Materials property if the area is redeveloped for non-industrial purposes.

REFERENCES

1. Washington State Department of Transportation. SR 290 Southriver Drive City of Spokane: Division Street to Perry Street. Limited environmental assessment report of known and suspected contaminated sites. *No Date.*

2. URS Consultants Inc. Screening Site inspection Report for Spokane Gas Manufacturing, Spokane, Washington, CERCLIS NO. WAD981762990. Prepared for United States Environmental Protection Agency/ Region 10. May 8, 1995.

3. Hatheway, A.W. Manufactured Gas Plants: Yesterday's Pride Today's Liability. *Civil Engineering*. November, 1997.

4. Hatheway, A.W. Analysis of Site & Waste Conditions at Spokane Gas Company FMGP, Spokane, Washington. Submitted to Robert Duff (DOH). March 27, 1998.

5. EMCON. Data package for SR 290 Southriver Drive Alignment Investigation, Spokane, Washington. Prepared for Washington State Department of Transportation. November 19, 1997.

6. Landau Associates Inc. Preliminary Site investigation, Former Spokane Manufactured Gas Plant, Spokane, Washington. Prepared for The Washington Water Power Company, Spokane WA 99220. February 9, 1998.

7. EPA Geographic Information Query System (Version 97.1.8). March 25, 1998.

8. CH2M HILL. Draft #3 City of Spokane, Wellhead Protection Program, Phase I technical assessment report. October, 1997.

9. Washington State Department of Health. Drinking Water Access Information Network. March 25, 1998.

10. Teleconference. Robert Duff (DOH) and Brad Phelps (CH2M HILL). April 2, 1998.

(FIGURE 1)

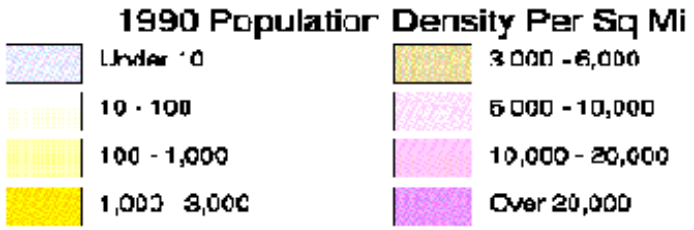
Figure 1. Site location map. (Adapted from Ref. 7)

(FIGURE 2)

Figure 2. Site map of former Spokane Gas and American Tar buildings along with soil boring and piezometer (monitoring well) locations. (Adapted from Ref. 4)

Figure 3. Location of public supply wells within a 1 and 2 mile radius of Brown Building Materials. (Adapted from Ref. 7)

(Figure 3)



LEGEND

▲ = Public Supply Well

✕ = Location of Brown Building Materials

APPENDIX A

(SITE PHOTOS)